

## Introducing Angles

Name(s): \_\_\_\_\_

An *angle* is sometimes defined as two rays that share an endpoint. But two segments with a common endpoint also determine an angle. And we usually name an angle after three points. If that's not confusing enough, *angle measure* is usually considered something different from an angle. In this activity, you'll explore angles and angle measures with Sketchpad.

### Sketch and Investigate

1. In the **Edit** menu, choose Preferences. Set the angle unit to degrees with precision to the nearest tenth.

Angle Unit: **degrees** Precision: **tenths**

Angle Unit and Precision menus from the Preferences dialog box (Macintosh)

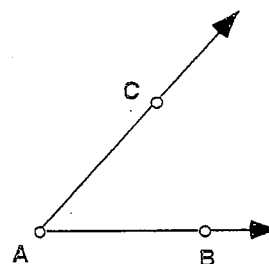


Hold the mouse button down on the active **Straight Object** tool to see the Straight Object tool palette, then drag to highlight the **Ray** tool.



The **Text** tool. To display or hide a label, click on the point. To change the label, double-click on the label.

2. Use the Ray tool to construct  $\overrightarrow{AB}$ .
3. Construct another ray,  $\overrightarrow{AC}$ , with the same endpoint A.
4. Drag each of the three points to make sure the two rays always share a common endpoint (point A).



5. If necessary, use the Text tool to display the point labels. Change them to match the figure.
- Q1 Two rays with a common endpoint form an angle. The common endpoint of the rays is called the *vertex* of the angle. Name the vertex of the angle you just made.



When you select an angle in Sketchpad, the vertex comes in the middle, just as when you name an angle.

6. Select, in order, points B, A, and C; then, in the **Measure** menu, choose **Angle**.
  7. Drag point B or point C and observe how the angle measure changes.
- Q2 Angles are usually named after three points: a point on one side, the vertex, and a point on the other side. What are two possible names for the angle you just made?

$\angle$  \_\_\_\_\_ and  $\angle$  \_\_\_\_\_

- Q3 What's the least angle measure you can make by dragging? What's the greatest?



- Q4 Drag a point on your angle until the angle's measure is as close to  $0^\circ$  as possible. Describe this angle.



- Q5 Drag a point on your angle until the angle's measure is as close to  $90^\circ$  as possible. Describe this angle.



- Q6 Drag a point on your angle until the angle's measure is as close to  $180^\circ$  as possible. Describe this angle.



- Q7 An *acute angle* has measure between  $0^\circ$  and  $90^\circ$ . Drag a point on your angle to make it acute. Sketch an example of an acute angle in the space at right. **Label diagram**

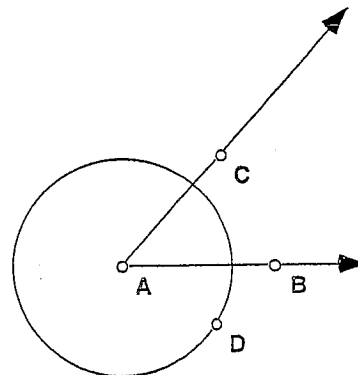
- Q8 An *obtuse angle* has measure between  $90^\circ$  and  $180^\circ$ . Drag a point on your angle to make it obtuse. Sketch an example of an obtuse angle in the space at right.

8. Draw a circle centered at point A and attach the circle radius end point on pt.C. of your current sketch. Then deselect everything.

Now delete ray AB. You now need to make a new ray AB that is attached at point B to the circle. Be sure you have a measure for the new angle BAC.

9. With point B selected choose in the display menu animate point.

10. Use the motion controller to stop and start your animation. With the animation on watch the change in the angle measure.



- Q9 With Preferences set to degrees, Sketchpad displays angle measures from  $0^\circ$  to  $180^\circ$ . So when one angle side rotates by more than one-half of a revolution from the other angle side, the angle measure starts to decrease. Suppose the angle measure kept increasing until the angle side had completed one whole revolution. What would be the largest angle measure?



- Q10 Draw an angle using the Segment tool. Does the measure of the angle depend on the lengths of the sides? Explain how you can demonstrate your answer to this question using Sketchpad.

